

REMARKS

Applicants thank the Examiner for the thorough consideration given the present application. Claims 1-13 are pending, of which claim 1 is independent. Reconsideration of this application is respectfully requested.

Rejections under 35 U.S.C. §103(a)

Applicants traverse and respectfully request reconsideration of the rejections of the claims as being unpatentable under 35 U.S.C. §103(a) as follows:

- claims 1-3 over U.S. Patent No. 5,790,400 to Higuchi in view of U.S. Patent No. 6,388,747 to Nara et al.;
- claims 4, 5, 8, and 9 over Higuchi in view of Nara et al. and further in view of U.S. Patent No. 6,276,997 to Li;
- claim 6 over Higuchi in view of Nara et al. and further in view of U.S. Patent No. 6,345,259 to Sandoval;
- claim 7 over Higuchi in view of Nara et al. and further in view of U.S. Patent No. 5,505,090 to Webster;
- claim 10 over Higuchi in view of Nara et al. and further in view of U.S. Patent No. 6,333,785 to Schmolke et al.;
- claim 11 over Higuchi in view of Nara et al. and further in view of U.S. Patent No. 6,335,559 to Charles;
- claim 12 over Higuchi in view of Nara et al. and further in view of U.S. Patent No. 6,190,313 to Hinkle;
- claim 13 over Higuchi in view of Nara et al. and further in view of U.S. Patent No. 6,353,169 to Juszkiwicz et al.

Independent claim 1 recites a system for dynamically monitoring stability of manufacturing equipment having a combination of elements, including a process executor for requesting a plurality of semi-manufactured products processed by the manufacturing equipment to be inspected at a first sampling rate and receiving a plurality of inspection results, a data processor for analyzing the inspection results from the process executor to determine a second sampling rate, a device for storing the second sampling rate, and a controller for receiving the second sampling rate from the storage device and changing the first sampling rate of the inspection requested by the process executor to the second sampling rate.

It is respectfully submitted that the combination of elements set forth in independent claim 1 is not disclosed or made obvious by the cited art, including Higuchi and Nara et al. In particular, ***neither Higuchi nor Nara et al. teaches or suggests a system for monitoring the stability of manufacturing equipment.***

The Office Action contends that Higuchi teaches an apparatus, system, and method for object inspection. In fact, Higuchi states:

An object inspection apparatus for ***clearly indicating the inspecting positions of an object under inspection*** so that inspection work thereon is performed efficiently has its inspection terminal set up on an inspection line. An image of the part to be inspected and a plurality of inspection items associated therewith are displayed on a screen of the terminal. The ***worker*** in charge of

inspection performs inspection by ***following what is thus displayed*** (emphasis added).

As can be seen, Higuchi discloses an object inspection apparatus that clearly indicates the inspection positions of an object under inspection, thus enabling basically unskilled workers to carry out the inspection.

In contrast to Higuchi, the present invention as set forth in independent claim 1 is directed to a system for monitoring the stability of manufacturing equipment by inspecting semi-manufactured work products during production. In the presently claimed invention, the inspection is directed by a process executor and is carried out automatically. Thus, the "inspecting positions of the object", a key feature of Higuchi's object inspection apparatus, are not needed in the presently claimed invention.

Nara et al. discloses an:

Inspection method, apparatus, and system for a ***circuit pattern***, in which when various conditions which are necessary in case of inspecting a fine circuit pattern by using an image formed by irradiating white light, a laser beam, or a charged particle beam are set, its operating efficiency can be improved (emphasis added).

Whereas the inspection apparatus of Nara et al. is designed to solve the problem of throughput deterioration caused by the inspection apparatus itself, the presently claimed invention is directed to a system for monitoring the stability of manufacturing

equipment by inspecting semi-manufactured work products periodically during production. Nowhere does Nara et al. teach or suggest a system for monitoring the stability of manufacturing equipment, as set forth in independent claim 1 of the present application.

In addition, **neither Higuchi nor Nara et al. teaches or suggests a sampling rate pertaining to inspection frequency.** At column 8, Higuchi states, "In the inspection process of step 207, inspection is carried out as many times as the sampling rate determined in step 206. For example, if the determined sampling rate is 32, a total of 32 parts are inspected." At column 38, line 58, Nara characterizes the sampling rate as the "rate at which the inspection region is thinned out".

Accordingly, the "sampling rate" of Higuchi is a setting specifying the **sampling ratio** of parts to be inspected, i.e., the number of parts checked per batch, as illustrated in FIG. 2 as a box of parts. In Nara et al., the "sampling rate" is a number of chips inspected per wafer, which creates a **special sampling ratio**.

In contrast to Higuchi and Nara et al., in the presently claimed invention, "sampling rate" refers to the number of inspections performed in a predetermined period of time, i.e., a **sampling frequency**. Therefore, the sampling rates of Higuchi and

Nara et al. cannot be equated to or compared with the sampling rate of the presently claimed invention.

In fact, **neither Higuchi nor Nara et al. teaches or suggests an apparatus having any component that is capable of processing sampling frequency.**

The Office Action alleges that the object inspection apparatus of Higuchi comprises every component of independent claim 1 of the present application.

Applicants respectfully disagree. Higuchi actually discloses:

an object inspection apparatus including a **display unit** for providing an image display; a **control unit** (e.g., a controller in an inspection terminal) **for causing the display unit to display** an image of an object under inspection and to indicate a plurality of inspection items regarding the object in conjunction with the image; and an **input unit** for inputting to the control unit the results of inspection corresponding to the inspection items displayed on the display unit (**emphasis added**).

While the Higuchi apparatus may appear to encompass every component of the present invention as set forth in independent claim 1, any resemblance is superficial. In Higuchi, the control unit is used for the display unit, not for controlling inspection or processing sampling frequency. As has been noted, Higuchi fails to provide any teaching or suggestion regarding sampling frequency processing.

The Office Action alleges that it would have been obvious to modify the system of Higuchi using the process executor, sampling rate input means, and display means of Nara et al. to automatically execute the parameter setting and data process in parallel with an inspecting operation.

However, at column 8, Nara et al. discloses that "***operating command and operating conditions*** of each portion of the apparatus are inputted and outputted to/from the ***control portion 21***" (emphasis added). Thus, the "control portion" of Nara et al. is used for processing an operating command and operating conditions of each portion of the apparatus. These operating conditions include a "sampling rate", which is described as the "rate at which the inspection region is thinned out". This is completely different from the sampling rate of the presently claimed invention. As can be seen then, Nara et al. also fails to teach or suggest the sampling frequency processing of the presently claimed invention.

Finally, ***neither Higuchi nor Nara et al. teaches or suggests an inspection system capable of monitoring run-to-run variability in semiconductor manufacturing.***

Applicants respectfully disagree with the characterization in the Office Action of the objection inspection apparatus of Higuchi as "broad enough and applicable to monitoring the stability of

manufacturing equipment". As discussed, Higuchi merely shows an object inspection apparatus for assisting workers in inspecting objects. Nara et al. provides an inspection apparatus for adjusting inspection conditions in a circuit pattern inspection. Both Higuchi and Nara et al. focus on improving inspection efficiency with a given machine-run. Neither Higuchi nor Nara et al. teaches or suggests run-to-run process control.

The presently claimed invention, however, provides a system for monitoring run-to-run variability and enables run-to-run process control in a wafer-manufacturing environment. The present invention allows for modification of a product recipe between machine runs, thereby minimizing process drift, shift, variability and, ultimately, costs.

In view of the foregoing, it is respectfully submitted that Higuchi and Nara et al., taken alone or in combination, fails to disclose or render obvious the presently claimed invention, and withdrawal of the rejections based thereon is respectfully requested. Since claims 2-12 depend directly or indirectly from allowable independent claim 1, they are also allowable for at least the same reasons as set forth above, as well as for the additional limitations provided by these claims. Accordingly, all claims are allowable.

CONCLUSION

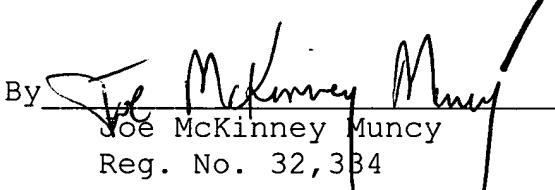
All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. It is believed that a full and complete response has been made to the outstanding Office Action, and that the present application is in condition for allowance.

If there are any outstanding issues, however, the Examiner is invited to telephone Ken Muncy at (703) 205-8000 in an effort to expedite prosecution.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to debit Deposit Account No. 02-2448 for any additional fee required under 37 C.F.R. §1.16 or §1.17, particularly extension of time fees, or to credit said Deposit Account for any overpayment of fees.

Respectfully submitted,

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